DECLARATION

I, NOBUAKI KATO, a Japanese Patent Attorney registered No. 8517, of Okabe International Patent Office at No. 602, Fuji Bldg., 2-3, Marunouchi 3-chome, Chiyoda-ku, Tokyo, Japan, hereby declare that I have a thorough knowledge of Japanese and English languages, and that the attached pages contain a correct translation into English of the priority documents of Japanese Patent Application No. 2003-107946 filed on April 11, 2003 in the name of CANON KABUSHIKI KAISHA.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made, are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

signed this 10th day of May, 2006

Nobuaki Kato

PATENT OFFICE
JAPANESE GOVERNMENT

This is to certify that the annexed is a true copy of the following application as filed with this Office.

Date of Application: April 11, 2003

Application Number: Japanese Patent Application No. 2003-107946

Applicant(s): CANON KABUSHIKI KAISHA

April 26, 2004

Commissioner, Patent Office YASUO IMAI (Seal)

Certificate No. 2004-3035798

[Name of the document]	Patent Application
[Reference No.]	250668
[Date]	April 11, 2003
[Addressed to]	Commissioner, Patent Office
[International Classification]	A61B 6/00
[Title of the Invention]	SCINTILLATOR PANEL
[Number of the Claims]	1
[Inventor]	
[Domicile or Residence]	c/o Canon Kabushiki Kaisha 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo
[Name]	YOSHIHIRO OGAWA
[Applicant]	
[Identification No.]	000001007
[Name]	CANON KABUSHIKI KAISHA
[Representative]	FUJIO MITARAI
[Attorney]	
[Identification No.]	100065385
[Patent Attorney]	
[Name]	JYOHEI YAMASHITA
[Telephone No.]	03-3431-1831
[Elected Attorney]	
[Identification No.]	100122921
[Patent Attorney]	
[Name]	HIROSHI SHIMURA
[Telephone No.]	03-3431-1831

[Indication of Official Fee]

[Prepayment Ledger No.] 010700

[Amount] 21000

[List of Filed Materials]

[Material] Specification 1

[Material] Drawings 1

[Material] Abstract 1

[General Power of Attorney] 0213163

[Proof Requirement] Required

[Name of the Document] Specification

[Title of the Invention] Scintillator Panel

[What is Claimed is:]

[Claim 1]

A scintillator panel, comprising:

a supporting substrate transmitting radiation, a phosphor layer for converting radiation into light, and moisture resistant protective layer,

the phosphor layer being formed on the supporting substrate, and the moisture resistant protective layer being formed on the supporting substrate,

wherein both side surfaces of the supporting substrate are covered by moisture-proof metal foils.

[Detail Explanation of the Invention]

[0001]

[Field of the Invention]

The present invention relates to a scintillator panel. Further, it relates to the scintillator panel for a radiation detecting apparatus which is used for a medical diagnosing apparatus, a non-destructive inspecting apparatus, or the like. More particularly, the present invention relates to the scintillator panel for the radiation detecting apparatus which is used for X-ray photographing or the like.

[0002]

Here, in this specification, explanation will be made on an assumption that electromagnetic waves such as X-ray, α-ray, β-ray, γ-ray and the like are also included in radiation.

[0003]

[Prior Art]

Hitherto, an X-ray film system including a fluorescent screen having an X-ray phosphor therein and a duplicated sensitive agent, has generally been used for photographing an X-ray picture.

However, in recent years, research and development have vigorously been made with respect to a digital radiation detecting apparatus, and various patent applications have also been filed. The digital radiation detecting apparatus including an X-ray phosphor layer and a 2-dimensional photodetector has advantages that image characteristics are excellent, and data which is digital data can be shared by fetching the data into a computer system connected to a network.

[0004]

As the digital radiation detecting apparatus, Japanese Patent No. 3126715 has disclosed a scintillator panel for a radiation detecting apparatus constructed in such a manner that a reflective layer and a protective layer of a thin metal film are formed on a supporting substrate which

transmits radiation, and further a phosphor layer is formed on the protective layer. By providing the protective layer between the phosphor layer and the reflective layer in the scintillator panel, it is prevented that a function of the reflective layer as a reflective film attenuates due to alteration or the like thereof by components and moisture contained in the phosphor layer.

[0005]

A needle-shape crystal of alkali halide is used as a scintillator material of these inventions. Further, a few percentage of metal such as Tb, Eu or the like is uniformly contained into alkali halide as a light emission activator. A vacuum evaporation depositing method is used for forming the needle-shape crystal. In order to simultaneously evaporation-deposit alkali halide and the light emission activator, and further, to make the most an effect of the light emission activator, the needle-shape crystal is left in an atmosphere of 200 to 260 °C.

[0006]

Examples of conventional type scintillator panels are shown in Figs. 7 and 8. Only a non-conductive layer 115 is formed on a supporting substrate 111 (Fig. 7), or a non-conductive layer 115 is formed on the supporting substrate 111 and a metal

reflective layer 114 is formed thereon (Fig. 8).

[0007]

In the scintillator panel for the radiation detecting apparatus disclosed in the prior art mentioned above, metal substrates such as an amorphous carbon substrate, an aluminum substrate or the like is used as the supporting substrate. Reasons why the amorphous carbon substrate is used as the supporting substrate are as follows.

[0008]

An absorption amount of X-ray of the amorphous carbon substrate is smaller than that of a glass plate or an aluminum plate, whereby a larger amount of X-ray can be transmitted through the phosphor layer. Chemical resistance of the amorphous carbon substrate is excellent. Heat resistance of the amorphous carbon substrate is excellent.

[0009]

However, the amorphous carbon substrate, metal substrate is made of a conductive material. For this reason, if the phosphor layer made of alkali halide is formed on the metal reflective layer such as the aluminum substrate or the like by using the amorphous carbon substrate as the substrate, there may be a case where the metal reflective layer alters due to electrochemical corrosion, and reflecting properties thereof are attenuated.

[0010]

On the other hand, forming the non-conductive protective layer on the surface of the amorphous carbon substrate takes a time and raises costs. Moreover, if a material of the non-conductive protective layer differs from that of the substrate, there is a problem that deformation is caused in dependence on a forming process. Further, since an adhesion defect between the non-conductive protective layer and the substrate occurs, which makes selection of the materials difficult.

[0011]

[Subject to be Solved by the Invention]

It is, therefore, a subject of the present invention to provide a scintillator panel in which a phosphor, particularly, a columnar phosphor can be easily formed, a uniform photoelectric conversion efficiency is obtained, and an image of high sensitivity and high sharpness can be provided.

[0012]

Another subject of the present invention is to provide a high-durability scintillator panel for a radiation detecting apparatus.

[0013]

Further another subject of the present invention is to provide a low-cost scintillator panel for a radiation detecting apparatus.

[0014]

[Means for Solving the Subject]

According to the invention, there is provided a scintillator panel comprisesg a supporting substrate transmitting radiation, a phosphor layer for converting radiation into light, and moisture-proof protective layer, the phosphor layer being formed on the supporting substrate, and the moisture resistant protective layer being formed on the supporting substrate, wherein both side surfaces of the supporting substrate are covered by moisture-proof metal foils.

[0015]

Preferred modes are shown below.

[0016]

The above supporting member is constituted by a non-conductive layer holding non-conductive property substantially, and a rigidity holding layer holding rigidity.

[0017]

The above rigidity holding layer is made of a heat resistant polymer, and the non-conductive layer contains a precursor component of the heat resistant polymer.

[0018]

The above heat resistant polymer is made of an aromatic polyimide, and the non-conductive layer

contains an aromatic polyimide precursor.

[0019]

Thickness of the above moisture-proof metal foils lies within a range from 10 to 100 μm.

[0020]

At least one of the moisture-proof metal foils is a reflection layer reflecting the light which is reflected by the phosphor layer upon irradiation of the radiation.

[0021]

[Preferred Embodiment of the Invention]

Hereinbelow, the present invention will be described in detail with reference to drawings.

[0022]

Fig. 1 is a cross sectional view showing one embodiment of a scintillator panel of the present invention. Fig. 2 is a diagram showing a manufacturing method of the scintillator panel of the present invention.

[0023]

Reference numeral 111 denotes a supporting substrate; 114 moisture-proof metal foils; 115 non-conductive layers; and 116 a rigidity holding layer. In the supporting substrate 111, the rigidity holding layer 116 is sandwiched by the two non-conductive layers 115, so that both surfaces of the supporting substrate 111 are constructed by substantially non-

conductive layers. The rigidity holding layer 116 can be a laminate in a state where it is completely separated like layers, or can be also constructed in such a manner that a rigidity holding member exists in the non-conductive layers without a distinct boundary to form the rigidity holding layer.

[0024]

The rigidity holding layer 116 is a member which substantially assures conductivity, and by providing the non-conductive layers 115 onto both surfaces of the rigidity holding layer 116, the supporting substrate 111 can be formed of which both surfaces are substantially non-conductive. By providing the moisture-proof metal foils 114 onto both surfaces of the supporting substrate 111, forces act uniformly via press molding substrates 117 upon pressing, whereby and a supporting substrate 118 can be preferably manufactured.

[0025]

Fig. 3 is a diagram showing another manufacturing method of the supporting substrate in the scintillator panel of the present invention. In Fig. 3, the supporting substrate 111 is formed by laminating a plurality of non-conductive layers 115 and a plurality of rigidity holding layers 116. As shown in Fig. 3, the non-conductive layers 115 are substantially formed on both outermost surfaces of

the supporting substrate 111. The moisture-proof metal foils 114 having characteristics as the reflective layers are laminated to be come into contact with the non-conductive layers 115 by a batch press molding by the press substrates, so that the supporting substrate 118 with the moisture-proof metal foils 114 is formed.

Although the moisture-proof metal foils 114 are formed on both surfaces of the supporting substrate 111, the moisture-proof metal foil provided on the side where no phosphor layer is formed, is used mainly as the moisture-proof layer. This moisture-proof foil can be also used as a reflective layer for preventing an external light from entering into a sensor, and further, as a magnetic shield by grounding. For this reason, as the moisture-proof metal foil, a layer having no pin hole is particularly desirable.

On the other hand, the moisture-proof metal foil formed on the side where the phosphor layer is provided, is formed as the moisture-proof layer and as the reflective layer. Therefore, as the reflective layer, a metal surface is preferable, which has a high reflectance and a high mirror surfaceness reflecting the light converted from the radiation by the phosphor layer and emitted therefrom.

[0026]

In a manufacturing method of the supporting substrate of the present invention, the supporting substrate is molded by a pressing. For this reason, surface properties of the moisture-proof metal foils reflect the properties of the surface which is in contact upon pressing. Generally, a pressing surface a pressing machine, or a demolding film is come into contact with the substrate to be pressed.

Therefore, the surface of the press molding substrates of the pressing machine, or at least one surface of the demolding film is provided with a surface of which surface properties are similar to desired surface properties of the moisture-proof metal foils.

[0027]

Fig. 4 is a cross sectional view showing the scintillator panel of the present invention. Here, a reference numeral 112 denotes a columnar phosphor layer made of alkali halide, and 113 indicates a moisture resistant protective layer. The supporting member 118 is constituted by forming the moisture-proof metal foils 114 on the both surfaces of the supporting substrate 111 including the rigidity holding layer 116 and the non-conductive layers 115.

A material made of alkali halide and a light emission activator is evaporation deposited under a condition of 25 to 150 °C onto the reflective surface

of the moisture-proof metal foil, to mold the phosphor layer 112 made of the columnar crystal. Further, the scintillator for radiation for digital X-ray photography (the phosphor layer) is formed by thermally processing them at temperatures of 200 to 260 °C.

After that, the whole surface is coated with the moisture resistant protective layer 113, so that the scintillator panel is completed.

[0028]

Fig. 5 is another cross sectional view showing a scintillator panel of the present invention. Here, a reference numeral 112 denotes a columnar phosphor layer made of alkali halide, and 113 indicates a moisture resistant protective layer. The supporting member 118 is constituted by forming the moisture-proof metal foils 114 on the both surfaces of the supporting substrate 111 including the rigidity holding layer 116 and the non-conductive layers 115.

A phosphor made of alkali halide and crystallized to the columnar shape is crystallized onto the reflective layer under a condition of not less than 200 °C to mold the phosphor layer 112. After that, portions of the moisture-proof metal foil 114 on which the phosphor layer is not formed are coated with the moisture resistant protective layer 113, so that the scintillator panel 110 for the

radiation detecting apparatus is completed.

[0029]

Generally, a moisture permeability of each of the moisture-proof metal foils is smaller than that of a layer made of an organic material. For example, in the case of a film made of paraxylylene as a typical organic moisture-proof film, its moisture permeability is equal to 30 $g/m^2 \cdot 24h$. In the case of an epoxy film as a general resin film, its moisture permeability is equal to 250 $g/m^2 \cdot 24h$.

However, the moisture permeability of the moisture-proof metal layer is equal to or less than 0.1 $g/m^2 \cdot 24h$ (25 μm), and thus a moisture resistant effect which is derived by forming the moisture-proof metal layer is large. For this reason, on the side where no phosphor layer is formed, if the moisture-proof metal foil 114 has already been provided and the moisture resistant effect thereof is sufficient, there is no need to further provide the moisture resistant protective layer 113 onto the moisture-proof metal foil 114.

[0030]

Fig. 6 is a cross sectional view of a radiation detecting apparatus obtained by adhering the foregoing scintillator panel to a 2-dimensional photodetector. The photodetector comprises a plurality of photoelectric converting elements and a

gap between the photoelectric converting elements on each of which an electric element such as a TFT or the like are arranged.

In Fig. 6, reference numeral 101 denotes a glass substrate; 102 a photoelectric converting element portion including a photosensor made of amorphous silicon and a TFT; 103 a wiring portion; 104 an electrode extracting portion; 105 a first protective layer made of silicon nitride or the like; and 106 a second protective layer made of polyimide or the like. A reference numeral 118 denotes the supporting substrate provided with the moisture-proof metal foils; 112 the phosphor layer made of the columnar phosphor; and 113 the moisture resistant protective layer made of the organic resin or the like.

The 2-dimensional photodetector 100 is constructed by the component elements 101 to 106, and the scintillator panel 110 is constructed by the component elements 111 to 113. A reference numeral 121 denotes an adhesive layer made of a transparent adhesive agent, and 122 a sealing portion. By adhering the photodetector 100 and the scintillator panel 110 via the adhesive layer 121 as mentioned above, the radiation detecting apparatus is obtained.

[0031]

It is desirable that the rigidity holding layer

is made of a material in which X-ray transmittance is high and heat resistance is high, and which has high rigidity. As preferred materials, there can be listed a resin such as polyimide resin, polyether imide resin, polyamide resin, polyacrylate resin, polyether sulfone resin, polysulfone resin, polyphenylene sulfide resin, polyether etherketone resin, fluororesin, polyether nitrile resin, bismaleinimide resin, or the like. Particularly, an aromatic polyimide resin having excellent heat resistance is preferable.

[0032]

As the non-conductive resin, it is desirable to use a precursor of the resin having an excellent adhesion property to the rigidity holding layer and the moisture-proof metal foils, and holding the rigidity.

When the rigidity holding layer is made of the aromatic polyimide, it is preferable that the non-conductive resin is made of an aromatic polyimide precursor. After a polyimide sheet of the rigidity holding layer, a polyimide precursor layer and the metal foils are laminated, they are integratedly laminated by bonding with a pressure and heat, so that the supporting substrate to which the metal foils are laminated is obtained.

In the present invention, the aromatic

polyimide precursor can be converted into imide in a part thereof, and it is obtained by polymerizing an aromatic diamine component and an aromatic tetracarvone component at a rate of an almost equal mole in an organic polarity solvent. Such the aromatic polyimide precursor itself can be manufactured by a well-known method.

[0033]

As the foregoing aromatic diamine component, for example, there can be listed benzenoid diamine such as 1,4-diaminobenzene (p-phenylenediamine), 1,3-diaminobenzene, 1,2-diaminobenzene, or the like; diphenyl (thio) ether diamine such as 4,4'-diamino diphenylether, 3,4'-diamino diphenylether, 3,3'-diamino diphenylether, 4,4'-diamino diphenylthioether, or the like; benzophenone diamine such as 3,3'-diamino benzophenone, 4,4'-diamino benzophenone, or the like; diphenylphosphine diamine such as 3,3'-diamino diphenylphosphine, 4,4'-diamino diphenylphosphine, or the like; diphenyl alkylene diamine such as 3,3'-diamino diphenylmethane, 4,4'-diamino diphenylmethane, 3,3'-diamino diphenylpropane, 4,4'-diamino diphenylpropane, or the like.

Further listed are diphenylsulfide diamine such as 3,3'-diamino diphenylsulfide, 4,4'-diamino diphenylsulfide, or the like; diphenylsulfone diamine such as 3,3'-diamino diphenylsulfone, 4,4'-diamino

diphenylsulfone, or the like; a benzidine class such as benzidine, 3,3′-dimethyl benzidine, or the like; bis (aminophenoxy) benzenoid diamine such as 1,3-bis (3-aminophenoxy) benzene or the like; bis (aminophenoxy) biphenyl diamine such as 4,4′-bis (3-aminophenoxy) biphenyl or the like; bis ((aminophenoxy) phenyl) sulfone such as bis ((4-aminophenoxy) phenyl) sulfone or the like; or the like. One of them can be solely used or a mixture of them can be used.

[0034]

As the foregoing aromatic diamine component, it is particularly preferable to use phenylenediamine such as 1,4-diaminobenzene (p-phenylenediamine) or the like solely, or a mixture of 50 mol% or more of phenylenediamine and 4,4′-diamino diphenylether.

[0035]

As the foregoing aromatic tetracarboxylic acid component, aromatic tetracarboxylic acid and its acid anhydride, salt, ester, or the like can be listed. Particularly, acid anhydride is preferable. As aromatic tetracarboxylic acid, for example, there can be listed 3,3′,4,4′-biphenyl tetracarboxylic acid; 2,3′,3,4′-bipheny tetracarboxylic acid; pyromellitic acid; 3,3′,4,4′-benzophenone tetracarboxylic acid; 2,2-bis (3,4-dicarboxyphenyl) propane; bis (3,4-dicarboxyphenyl) methane; bis (3,4-dicarboxyphenyl)

ether; bis (3,4-dicarboxyphenyl) thioether; bis (3,4-dicarboxyphenyl) phosphine; bis (3,4-dicarboxyphenyl) sulfone; or the like.

[0036]

As the material of the moisture-proof metal foils, an arbitrary material can be used so long as it is a metal which can be formed as foils of Al, Ag, Cr, Cu, Ni, Ti, Mg, Rh, Pt, Au, and the like. Particularly, using the metal having high reflectance to the light of a wavelength which is converted by the phosphor layer is preferable.

[0037]

The moisture resistant protective layer 113 covering the phosphor supporting member and whole of the phosphor layer is provided for a purpose of protecting the moisture proof, and an arbitrary material can be used so long as such the purpose is accomplished. It is desirable to use a CVD film such as polyparaxylylene and the like disclosed in Japanese Patent Laid-open No.2000-9845, a plasma polymerizing film of the organic substance.

[0038]

Embody modes of the present invention will be described below.

[0039]

[embody mode 1]

A scintillator panel comprising a supporting

substrate transmitting radiation, a phosphor layer for converting radiation into light, and moisture resistant protective layer, the phosphor layer being formed on the supporting substrate, and the moisture resistant protective layer being formed on the supporting substrate, wherein both side surfaces of the supporting substrate are covered by moisture-proof metal foils.

[0040]

[embody mode 2]

A scintillator panel according to embody mode 1, wherein the supporting substrate is formed by a plurality of non-conductive layers holding non-conductivity substantially, and a plurality of rigidity holding layers holding rigidity.

[0041]

[embody mode 3]

A scintillator panel according to embody mode 2, wherein the rigidity holding layer is made of a heat resistant polymer, and the non-conductive layer contains a precursor component of the heat resistant polymer.

[0042]

[embody mode 4]

A scintillator panel according to embody mode 3, wherein the heat resistant polymer is made of an aromatic polyimide resin, and the non-conductive

layer contains an aromatic polyimide precursor.

[0043]

[embody mode 5]

A scintillator panel according to embody mode 1, wherein thickness of the moisture-proof metal foils lies within a range from 10 to 100 μm.

[0044]

[embody mode 6]

A scintillator panel according to one of embody modes 1 to 5, wherein at least one of the moisture-proof metal foils is a reflective layer reflecting light emitted from the phosphor layer upon irradiation of radiation.

[0045]

[Examples]

Next, the radiation detecting apparatus of the present invention will now be described in detail on the basis of Examples.

(Example 1)

As shown in Fig. 6, on a glass substrate 101, photodetecting element portions (pixel portions) 102 are formed by thin semiconductor films made of amorphous silicon. On the photodetecting element portion 102, a first protective layer 105 made of SiNx is formed, and further, a second protective layer 106 is formed by spincoating a polyimide resin hardened at 200°C for 6 hours, thereby manufacturing

a photodetector 100.

[0046]

Subsequently, onto both surfaces of the aromatic polyimide resin substrate having a thickness of 0.5 mm, aromatic polyimide precursors having a thickness of 5 μm are coated. As the moisture-proof metal foils, aluminum foils having a thickness of 20 μm are laminated onto the surfaces of the aromatic polyimide precursors, pressed, and thereafter, pressed with pressure and heat at 270°C, thereby obtaining the supporting substrate.

[0047]

The supporting substrate is molded by a vacuum pressure hot pressing machine. A surface roughness Ra of one of pressing surfaces of the pressing machine is set to 0.1, a vacuum atmosphere is set to 101 kPa (760 mmHg), a pressing temperature is set to 270°C, a pressing pressure is set to 3.04 MPa (30 kgf/cm^2), and a pressing time is set to 90 minutes.

[0048]

Onto a surface of the moisture-proof metal foil having the mirror surface properties of the supporting substrate, a phosphor layer of the needle-shape crystal made of CsI:Tl is formed by the evaporation depositing method. The protective layer made of polyparaxylylene resin is formed onto the whole surface of them by the CVD method, thereby

obtaining the scintillator panel 110.

[0049]

The scintillator panel thus obtained is laminated and adhered to the photodetector, thereby constructing the radiation detecting apparatus.

(Example 2)

A photodetector 100 is manufactured in a manner similar to that of the Example 1.

[0050]

On one of surfaces of the moisture-proof metal foils of the supporting substrate obtained in the Example 1, the resin layer made of the polyimide precursor is formed by thickness of 5 μm. After the heating treatment under 270 °C, the phosphor layer made of CsI: Tl is formed similar to the Embodiment 1.

[0051]

The radiation detecting apparatus manufactured as mentioned above is held in a testing chamber of a temperature of 60°C and a humidity of 90% for 1000 hours. As a result, defective appearances such as a positional deviation of the phosphor layer or a peel-off between the layers or the like has not occurred. Further, deterioration in reflecting characteristics of the reflective layer due to corrosion thereof has not been detected at all. Thus, the radiation detecting apparatus of high reliability was obtained.

(Comparison Example 1)

A photodetector 100 was manufactured in a manner similar to that of the Example 1.

[0052]

Subsequently, on the phosphor supporting substrate (amorphous carbon substrate: size of 450 mm × 450 mm, and a thickness of 1 mm), an Al layer (thickness of 5000Å) is formed as a reflective layer by a sputtering method. The columnar phosphor layer and the moisture resistant protective layer are formed in a manner similar to that of the Example 1, thereby obtaining the scintillator panel. A radiation detecting apparatus is obtained in a manner similar to that of the Example 1.

(Comparison Example 2)

After the reflective layer is formed on the supporting substrate in a manner similar to that of the Comparison Example 2, a SiNx film having thickness of 300 nm is further formed by the sputtering method as the protective layer.

A radiation detecting apparatus is obtained in a manner similar to that of the Example 1.

[0053]

Next, the radiation detecting apparatus obtained in each of the Comparison Examples is held in a durability testing of temperature of 60°C and humidity of 90% for 1000 hours. After that, occurrence of the defects due to a peel-off, breakage,

and the corrosion on an image was observed. As a result, a number of pixel defects which are assumed to be caused by the corrosion of the Al occurred in both the Comparison Example 1 and Comparison Example 2.

[0054]

[Effect of the Invention]

As described above, according to the present invention, following effects are obtained.

[0055]

Since the layer constituting the supporting substrate of the scintillator panel is prevented from deformation, the phosphor layer can be precisely formed with a desired thickness, the phosphor layer has no variation in thickness, the phosphor layer is reduced in a fluctuation of light absorption. Thus, the radiation apparatus of high uniformity can be obtained.

[0056]

Since the supporting substrate of the scintillator panel is molded by the batch pressing operation, there is no need to newly provide the protective layers and the reflective layer, which results in the reduced number of manufacturing steps. Thus, the low-cost scintillator panel for the radiation detecting apparatus can be realized.

[0057]

When the radiation detecting apparatus is constructed by the scintillator panel, such a stress that forces a warp is not applied to the scintillator panel, whereby a peel-off and breakage of the phosphor do not occur. Thus, particularly, the moisture resistant property and the durability are improved.

[0058]

During the manufacturing steps of the scintillator panel no warp thereof occurs, so that the occurrence of defective positional precision due to the warp can be prevented in the adhering step, the connecting step of electric installation parts, and the assembling step.

[Brief Description of the Drawings]

[Fig. 1]

It is a cross sectional view showing a construction of an embodiment of a phosphor supporting substrate in a scintillator panel of the present invention.

[Fig. 2]

It is a cross sectional view showing a manufacturing method of the embodiment of the phosphor supporting substrate in the scintillator panel of the present invention.

[Fig. 3]

It is a cross sectional view showing another

manufacturing method of the embodiment of the phosphor supporting substrate in the scintillator panel of the present invention.

[Fig. 4]

It is a cross sectional view showing a construction of an embodiment of the scintillator panel of the present invention.

[Fig. 5]

It is a cross sectional view showing a construction of another embodiment of the scintillator panel of the present invention.

[Fig. 6]

It is a cross sectional view showing a construction of an embodiment of a radiation detecting apparatus using the scintillator panel of the present invention.

[Fig. 7]

It is a cross sectional view showing a construction of an embodiment of a phosphor supporting substrate in a conventional scintillator panel.

[Fig. 8]

(a) is a cross sectional view showing a manufacturing method of the embodiment of the phosphor supporting substrate in the conventional scintillator panel, and (b) is a cross sectional view showing a manufacturing method of the embodiment of

the phosphor supporting substrate in the conventional scintillator panel.

[Fig. 9]

It is a diagram showing a system using the scintillator panel of the present invention.

[Explanation of References]

100: photodetector

101: glass substrate

102: photoelectric converting element portion

103: wiring portion

104: electrode extracting portion

105: first protective layer made of silicone nitride or the like

106: second protective layer made of polyimide or the like

110: scintillator panel

111: supporting substrate

112: phosphor layer made of columnar phosphor

113: moisture resistant protective layer

114: moisture-proof metal foil

115: non-conductive layer

116: rigidity holding member

117: pressing substrate

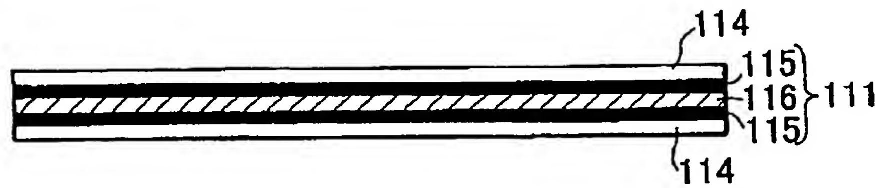
118: supporting substrate with moisture-proof metal foil

121: adhering layer made of transparent adhering agent

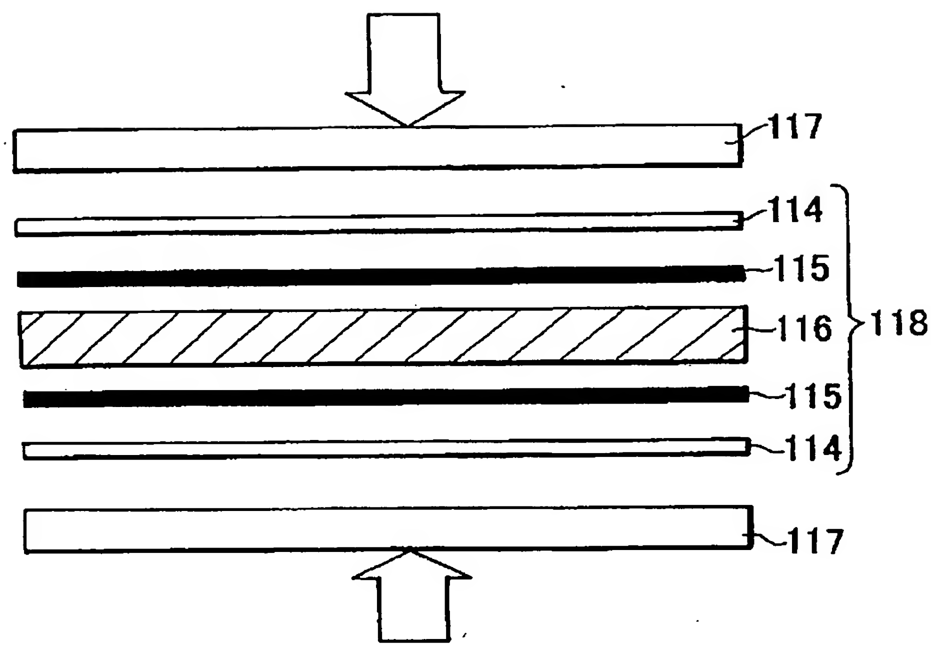
122: sealing portion

【書類名】　図面

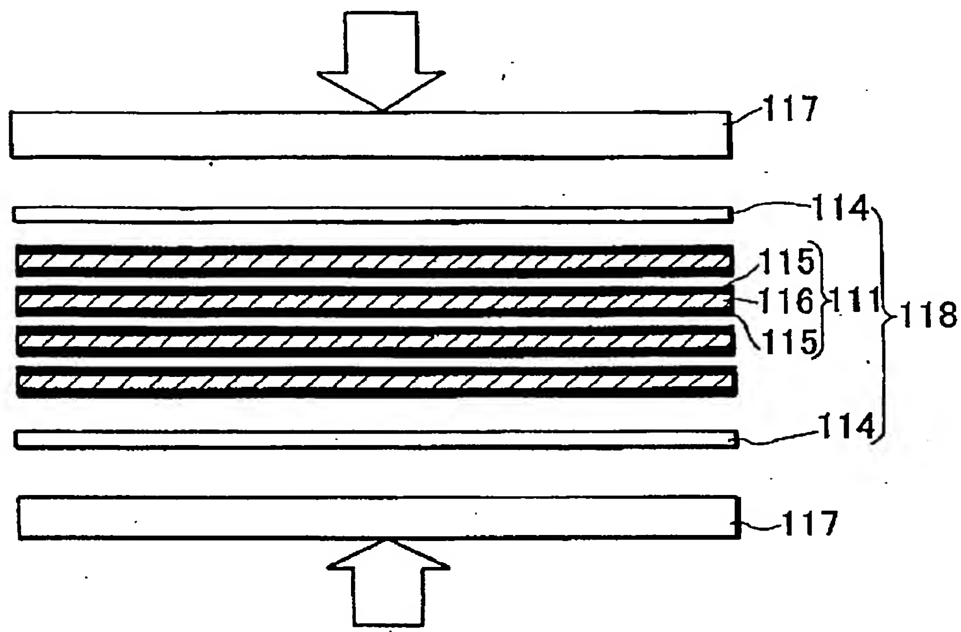
~~【図１】~~ Fig. 1



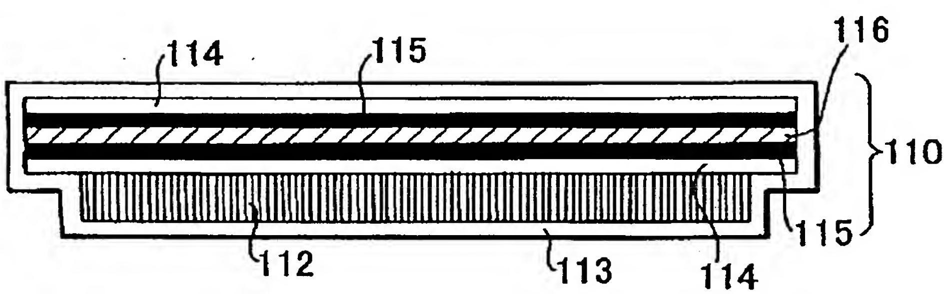
~~【図２】~~ Fig. 2



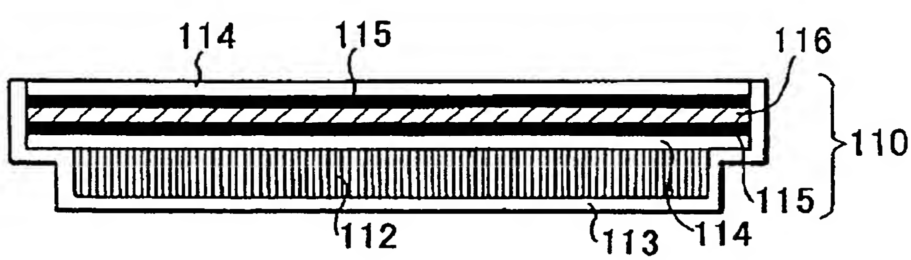
~~【図３】~~ Fig. 3



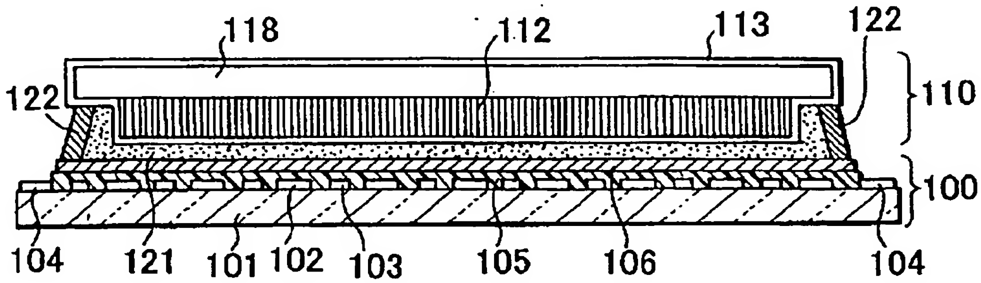
~~【図４】~~ Fig. 4



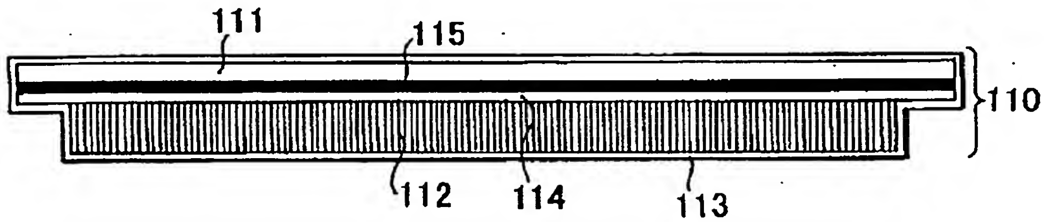
~~【図５】~~ Fig. 5



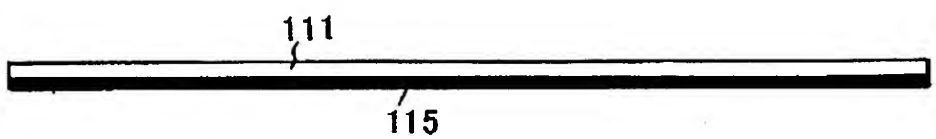
~~【図６】~~ Fig.6



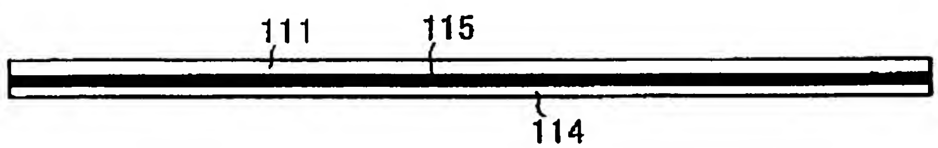
~~【図７】~~ Fig.7



~~【図８】~~ Fig. 8.

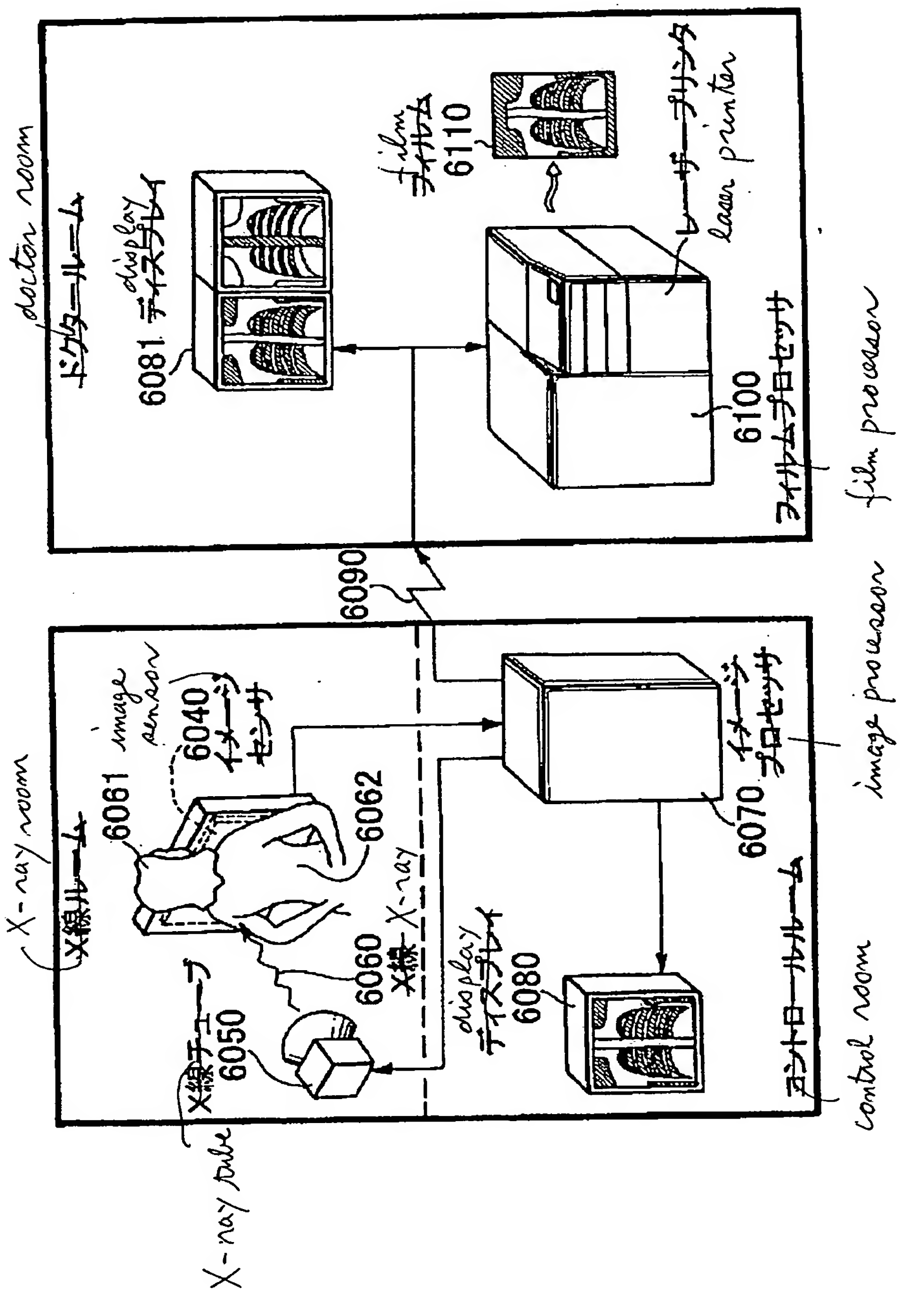


(a)



(b)

~~【図9】~~ Fig. 9


ドクタールーム
doctor room
6081
ディスプレイ
display
フィルム
film
6110
レーザープリンタ
laser printer
6100
フィルムプロセッサ
film processor
6090
X線ルーム
X-ray room
6061
6040
イメージセンサ
image sensor
6062
6070
イメージプロセッサ
image processor
6060
X線
X-ray
6080
ディスプレイ
display
6050
X線チューブ
X-ray tube
コントロールルーム
control room

[Name of the Document] Abstract

[Abstract]

[Subject]

To provide a scintillator panel in which uniform photoelectric converting efficiency is obtained, and an image of a high sensitivity and a high sharpness is obtained,

[Solving Means]

A scintillator panel comprises a supporting substrate transmitting radiation, a phosphor layer for converting radiation into light, and moisture resistant protective layer, the phosphor layer being formed on the supporting substrate, and the moisture resistant protective layer being formed on the supporting substrate, wherein both side surfaces of the supporting substrate are covered by moisture-proof metal foils. The supporting substrate is constituted by a moisture-proof metal foils holding non-conductivity substantially, and a rigidity holding layer holding rigidity. In addition, both surfaces of the supporting substrate are covered by moisture-proof metal foils. The moisture-proof metal foils, non-conductive layer and rigidity holding layer are molded integrally by a press molding. Hard aluminum foil is preferable as the moisture-proof metal foil, polyimide is preferable as non-conductive layer, and carbon fiber reinforced resin is

preferable as the rigidity holding layer, respectively.

[Selected Fig.] Fig. 1

Applicant's Information

Identification No.	[000001007]
1. Date of Change:	August 30, 1990
(Reason of Change)	New Registration
Address:	3-30-2, Shimomaruko, Ohta-ku, Tokyo
Name:	CANON KABUSHIKI KAISHA